

What is claimed is:

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1. A digitally-integrating image sensor, comprising:
a semiconductor substrate;
a CMOS image sensor, formed on said semiconductor substrate,
which produces image output information which, when sampled,
indicates a value of a number of photons of an imaged scene which
have impinged thereon; and
a digital memory, also formed on said semiconductor
substrate, and connected to receive outputs from said CMOS image
sensor, and to integrate output values from said CMOS image
sensor in the digital memory array.
2. A sensor as in claim 1, further comprising an analog to
digital converter, receiving the outputs from said CMOS image
sensor, converting said outputs to a digital form, and wherein
said digital memory receives said digital form outputs.
3. A sensor as in claim 2, wherein said analog to digital
converter is an oversampling converter.
4. A sensor as in claim 2, wherein each pixel of said CMOS
image sensor is sufficiently small that it lacks sufficient

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capacity to integrate incoming photons for a desired integration time.

5. A sensor as in claim 2, further comprising a fixed pattern noise reduction circuit, between said CMOS image sensor and said analog to digital converter.

6. A digitally-integrating image sensor, comprising:
a semiconductor substrate;
a CMOS image sensor, formed on said semiconductor substrate, which produces image output information, each pixel of said CMOS image sensor is sufficiently small that it lacks sufficient capacity to integrate incoming photons for a desired integration time, said image output information indicating a value of a number of photons of an imaged scene which have impinged thereon;
a noise reduction circuit, formed on said semiconductor substrate, and reducing an amount of noise in said image output information to form noise-reduced image output information;
an analog to digital converter, formed on said semiconductor substrate, and operating to convert said noise-reduced image output information to digital form noise-reduced image output information at specified intervals, each said specified interval being shorter than said desired integration time; and

a digital memory, also formed on said semiconductor substrate, and connected to receive said digital form noise-reduced image output information outputs from said CMOS image sensor, and to integrate said digital formed noise-reduced image output information from said CMOS image sensor in the digital memory array for a time equivalent to said desired integration time to output integrated digitally integrated digital image data.

7. A device as in claim 6, wherein said CMOS image sensor is an active pixel sensor.

8. A method of acquiring an image, comprising:
forming a CMOS image sensor on a semiconductor substrate;
using said CMOS image sensor to image a scene and to produce image output information;

sampling each pixel of said CMOS image sensor at a time period less than a desired integration time for each frame of the image;

converting each sampled pixel to digital;

storing the digitally-converted pixels in a digital memory, and using said digital memory to digitally integrate said digital pixels for the desired integration time, to thereby output a digitally integrated image.